

FORM PTO-1390 (Modified)  
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

KSN0013

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/831415

INTERNATIONAL APPLICATION NO.

PCT/DE99/03493

INTERNATIONAL FILING DATE

2 November 1999

PRIORITY DATE CLAIMED

10 November 1998

TITLE OF INVENTION

ELECTRICAL COMPONENTS FOR PRINTED BOARDS AND METHOD FOR AUTOMATICALLY  
INSERTING SAID COMPONENTS IN PRINTED BOARDS

APPLICANT(S) FOR DO/EO/US

Reginald Leeman, Bernard Houteman, Georges Embo, and Edgard Acke

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). **unsigned**
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Return Postcard, A copy of the Notification to the International Bureau concerning a change of Applicant;  
Check No. 15069 in the amount of \$860.00



09/831415

JC08 Rec'd PCT/PTO 09 MAY 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Reginald Leeman, Bernard Houteman,  
Georges Embo, and Edgard Acke

Filed: PCT/DE99/03493 November 2, 1999

For: ELECTRICAL COMPONENTS FOR  
PRINTED BOARDS AND METHOD FOR  
AUTOMATICALLY INSERTING SAID  
COMPONENTS IN PRINTED BOARDS

Commissioner for Patents and Trademarks  
Washington DC 20231

Dear Sir:

**PRELIMINARY AMENDMENT**

In the above-mentioned PCT application, please accept the enclosed application under the national stage pursuant to 35 USC § 371 and amend the application as follows:

**In the Specification:**

On Page 4, line 135, replace the paragraph with the following paragraph.

The housing 1, which may also be a metal housing, in the instant case consists of metallized plastics material. On the mating plug side 2 thereof, it has four coaxial sockets 3 in a row and column arrangement. The layer thickness of the metallization of housing 1 is at least equal to the depth of penetration of the electromagnetic waves to be transmitted via the circuit board component.

In the Claims:

Please replace claims 1-9 of the application with claims 1-9 as follows:

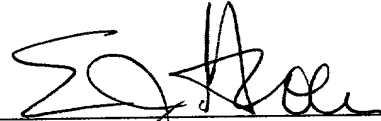
1. An electrical component for circuit board mounting, comprising a connector housing and surface mount solder connections provided on the bottom side of said housing for interconnection of the housing to the circuit board by way of solder joints between solder connections assigned thereto on the circuit board, the housing further comprising a plurality of solderable bolt pins on the bottom side of the housing for additionally securing the housing to the circuit board, said bolt pins being profiled for engagement in continuous plated bolt holes assigned thereto on the circuit board and are soldered in said bolt holes.
2. An electric circuit board component according to claim 1, wherein the solder joints between the housing-side bolt pins and the bolt holes in the circuit board are in the form of surface mount solder joints.
3. An electric circuit board component according to claim 1, wherein the housing, inclusive of the bolt pins thereof, consists of plastic material, and in that at least the bolt pins are provided with a solderable metallization.
4. An electric circuit board component according to claim 3, wherein the metallized bolt pins are at reference potential.
5. An electric circuit board component according to claim 1, wherein the cross-sectional area of the bolt pins is selected to be considerably larger than the cross-sectional area of solder pins made of thin wires, as usually employed with such components.
6. An electric circuit board component according to claim 5, wherein the cross-sectional area of the bolt pins, in consideration of the number and material thereof, is selected to be so large that the mechanical load carrying capacity of the secured state of the housing on the circuit board sufficiently fulfills the requirements to be met thereby.

7. An electric circuit board component according to claim 1, wherein the bolt pins projecting beyond the bottom side of housing constitute lugs preferably integrally formed on the lower edge of housing on the outsides of side walls and back wall thereof.
8. An electric circuit board component according to claim 1, wherein the plated inner wall of the bolt holes in the circuit board is of slightly conical design, and that the thus-designed bolt holes have their largest inside width on the side of circuit board where the housing-side bolt pins engage in the bolt holes.
9. A method of automatically providing circuit boards with electric circuit board components, where the components include a component housing and surface mount solder connections provided on the bottom side of said housing for interconnection of the housing to the circuit board, and a plurality of solderable bolt pins on the bottom side of the housing for additionally securing the housing to the circuit board, the method comprising the steps of:
  - providing all solder connections and all bolt holes on the circuit board with a layer of soldering paste;
  - picking up the housing by an automatic pick and place machine and applying the housing to the circuit board exploiting the centering possibilities established by the bolt pins on the housing and the bolt holes in the circuit board; and
  - passing the circuit board along with the housing applied thereto through an SMD soldering furnace in which, in one operation, the housing-side SMD solder connections of the contacting feet are firmly soldered to the solder connections assigned thereto on the circuit board on the one hand, and the bolt pins on the housing are firmly soldered to the bolt holes assigned thereto on the circuit board on the other hand.

**REMARKS**

Applicants respectfully request that the above preliminary amendment be entered, and that the fees due herewith are calculated using the new claims, not the claims of the PCT application.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Eric J. Groen", written over a horizontal line.

Eric J. Groen, Reg. No. 32,230  
BAKER & DANIELS  
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South Bend IN 46601  
(219) 234-4149

## VERSION WITH MARKINGS TO SHOW CHANGES MADE

- 135 The housing 1, which may also be a metal housing, in the instant case consists of metallized plastics material. On the mating plug side 2 thereof, it has four coaxial sockets 3 in a row ~~an~~ and column arrangement. The layer thickness of the metallization of housing 1 is at least
- 140 equal to the depth of penetration of the electromagnetic waves to be transmitted via the circuit board component.

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F04460-0344E860

**Specification**

- 5 Electric Circuit Board Component and Method of Automatically Providing Circuit Boards with such Components

10 The invention relates to an electric circuit board component, in particular an RF coaxial connector, in which the housing of the component is secured on the circuit board by way of solder joints between the SMD solder connections provided on the bottom side of said housing and solder connections assigned thereto on the circuit board.

15 Electric circuit board components, in particular RF coaxial connectors, are frequently employed in electric transmission and connection means. Basically, there are employed three different connection types for the electrical connection between the mutually associated terminals on the side of the component and on the side of the circuit board.

25 In the connection type - first connection type - as employed e.g. in the connector known from document EP 0 582 960 A1, there are used pressing pins, whereby a soldering operation can be dispensed with. However, the utilization of such relatively voluminous pressing pins presupposes that the number thereof per component be limited in consideration of the as small as possible dimensions of such components. However, the number thereof per component is also limited considerably in that the pressing force to be applied in urging the pressing pins on the component side into the associated plated connecting holes on the circuit board side must not exceed  
35 a value given by the strength of the component. For, the pressing force to be applied is proportional to the num-

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ber of pressing pins provided. The automatic provision  
of circuit boards with such components requires very ex-  
40 pensive devices.

In the connection type - second connection type - as em-  
ployed for example with the connector known from docu-  
ment EP 0 488 482 A1, the terminals consist of solder  
45 pins made of thin wires. Such solder pins may also be  
employed in relatively large numbers for components of  
quite small dimensions. However, such connectors upon  
mounting thereof must be applied manually to the circuit  
board, as it is difficult to introduce the thin solder  
50 pins into their associated connecting holes in the cir-  
cuit board. Upon application of such connectors on the  
circuit board, soldering of the solder pins in their as-  
sociated connecting holes in the circuit board takes  
place by flow soldering.

55 In case of the connection type - third connection type -  
as utilized e.g. for the connector known from document  
DE 197 16 139 C1, so-called SMD (surface mounted device)  
solder connections are employed for establishing the  
60 electrical connections between component and circuit  
board. The provision of the circuit boards with compo-  
nents having SMD solder connections, in contrast to  
those having pressing pins or solder pins, has the great  
advantage that it can be carried out simply and rapidly  
65 by means of automatic "pick & place" machines. The dis-  
advantage thereof is the low anchoring strength of the  
component on the circuit board established by these sol-  
dering joints. For this reason, the component must be  
70 additionally secured to the circuit board by means of  
bolts or rivets, so as to prevent damaging or even tear-  
ing off of the SMD solder joints due to occasionally un-  
avoidable higher mechanical loads.

It is the object of the invention to indicate a further  
75 solution for sufficiently securing electric components  
having SMD solder connections to circuit boards, which  
does not require screws or rivets and is particularly  
simple in terms of production technology.

80 According to the invention, this object is met for such  
an electric circuit board component in that the housing,  
for additionally securing the same to the circuit board,  
has on the bottom side thereof a plurality of solderable  
85 bolt pins which engage in continuous plated bolt holes  
assigned thereto on the circuit board and are soldered  
in said bolt holes.

The invention is based on the finding that the loading  
of circuit boards with the aid of automatic pick & place  
90 machines is also possible if the component has solder-  
pin-like connecting elements which are soldered in the  
circuit board in associated continuous plated holes. The  
sole prerequisite in this regard is that their cross-  
sectional area is sufficiently large to allow utiliza-  
95 tion thereof as centering means by the automatic pick &  
place machines upon application of the component to the  
circuit board.

Expedient developments of the subject matter according  
100 to claim 1 are indicated in the additional claims 2 to  
8.

A further development is indicated in claims 9 and 10 in  
the form of method of automatically providing circuit  
105 boards with circuit board components making use of the  
invention, with said method being particularly advanta-  
geous in terms of time and costs.

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110 The invention will be elucidated in more detail herein-  
after by way of an embodiment shown in the drawings  
wherein

Fig. 1 shows a perspective view of an embodiment in the  
form of an RF angular connector,

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Fig. 2 shows a schematic view of the anchoring of bolt  
pins on the housing in bolt holes in the circuit  
board according to a first embodiment,

120 Fig. 3 shows a schematic view of the anchoring of bolt  
pins on the housing in bolt holes in the circuit  
board according to a second embodiment.

125 The first embodiment of an electric circuit board compo-  
nent illustrated in Fig. 1 is an RF angular connector.  
The basic structure thereof corresponds to the connector  
already known from the initially indicated document DE  
197 16 139 C1. For this reason, it should be sufficient  
to deal with the structure of the constructional shape  
130 of this first embodiment only in so far as it is neces-  
sary for the understanding of the invention and, as for  
the rest, to make reference to the document mentioned as  
regards closer details thereof.

135 The housing 1, which may also be a metal housing, in the  
instant case consists of metallized plastics material.  
On the mating plug side 2 thereof, it has four coaxial  
sockets 3 in a row an column arrangement. The layer  
thickness of the metallization of housing 1 is at least  
140 equal to the depth of penetration of the electromagnetic  
waves to be transmitted via the circuit board component.

Housing 1 has contacting feet 4 and 5, of which contact-  
ing feet 4 are arranged in a multiplicity on the outside  
145 of housing 1 near the bottom side 6 thereof. Contacting

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as good as possible fixing of housing 1 on circuit board 7 after the SMD solder joints have been established. As shown in practical application, the fixing of the housing attainable by SMD solder joints, however, is poor also with a larger number of SMD solder joints, so that the mechanical load capacity to be demanded for such fixing cannot be ensured to a sufficient extent.

For sufficient mechanical securing of housing 1 on circuit board 7, there are provided several solderable bolt pins 11, as shown in Fig. 1, between contacting feet 4 as well as on the outsides of side walls 8 and 9 and back wall 10 and on the edge of bottom side 6 on the mating plug side 2; these bolt pins 11 project beyond contacting feet 4 and 5 and, upon application to circuit board 7, engage in associated contact-establishing or plated bolt holes 12 in circuit board 7 in which they are soldered. Like housing 1, the bolt pins 11 consist of plastics material. Like the contacting feet 4, they are formed on the housing walls in the manner of supporting webs and are metallized.

Soldering of the bolt pins 11 of the housing in the plated bolt holes 12 in the circuit board, as in case of soldering solder pins, can be effected by flow soldering in which circuit board 7 is passed with the bottom side 14 thereof across a flow soldering bath, with the housing 1 being arranged on the top side 13 of said circuit board. Thus, in this case it is necessary to carry out two soldering operations when circuit board 7 is provided with a housing 1.

A first soldering operation is necessary for establishing the electrical connections between the SMD solder terminals of contacting feet 4 and 5 of the housing and the solder terminals assigned thereto on circuit board 7. In this process, circuit board 7 having housing 1 ar-

220 ranged thereon is passed through an SMD soldering furnace. Thereafter, a second soldering operation has to be carried out using a flow soldering bath for soldering the bolt pins 11 of the housing to their associated plated bolt holes 12 in the circuit board. However, soldering of the bolt pins 11 on the housing in the associated plated bolt holes 12 in the circuit board may also be carried out in particularly advantageous manner in accordance with the SMD soldering method, so that only one soldering operation has to be carried out in securing a housing 1 to circuit board 7. This fact shall be dealt with in more detail hereinafter with reference to Figs. 2 and 3.

235 Figs. 2 and 3 schematically illustrate the course of the SMD soldering operation. Each of Figs. 2 and 3 shows a housing 1 arranged on circuit board 7. Each of the housings 1 is shown with two bolt pins 11 only, one thereof being integrally formed on the left-hand side wall 8 and the other one thereof being integrally formed on the right-hand side wall 9. Both bolt pins 11 engage in their associated bolt holes 12 in circuit board 7. The central vertical subdivision of housing 1 and circuit board 7 into left-hand and right-hand halves is supposed to indicate the SMD soldering operation. The plated bolt hole 12 in the circuit board, along with the bolt pin 11 of the housing engaging therein, in the left-hand half illustrates the condition prior to passage of the circuit board 7 along with the housing 1 arranged thereon through the SMD soldering furnace, whereas the right-hand half illustrates the condition after passage thereof through the SMD soldering furnace.

Before application of housing 1 to circuit board 7, all soldering connections or areas on the top side 13 of circuit board 7 must be provided with a soldering paste layer. To this end, a soldering paste mask is employed.

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**Claims**

1. An electric circuit board component, in particular an RF coaxial connector, in which the housing (1) of the component is secured on the circuit board (7) by way of solder joints between SMD solder connections provided on the bottom side (6) of said housing and solder connections assigned thereto on the circuit board,
- characterized in that the housing (1), for additionally securing the same to the circuit board (7), has on the bottom side (6) thereof a plurality of solderable bolt pins (11) which engage in continuous plated bolt holes (12) assigned thereto on the circuit board (7) and are soldered in said bolt holes.
2. An electric circuit board component according to claim 1,
- characterized in that the solder joints between the housing-side bolt pins (11) and the bolt holes (12) in the circuit board are in the form of SMD solder joints.
3. An electric circuit board component according to claim 1 or 2,
- characterized in that the housing (1), inclusive of the bolt pins (11) thereof, consists of plastics material, and in that at least the bolt pins (11) are provided with a solderable metallization.
4. An electric circuit board component according to claim 3,
- characterized in that the metallized bolt pins (11) are at reference potential.



5. An electric circuit board component according to any of the preceding claims, characterized in that the cross-sectional area of the bolt pins (11) is selected to be considerably larger than the cross-sectional area of solder pins made of thin wires, as usually employed with such components.
6. An electric circuit board component according to claim 5, characterized in that the cross-sectional area of the bolt pins (11), in consideration of the number and material thereof, is selected to be so large that the mechanical load carrying capacity of the secured state of the housing (1) on the circuit board (7) sufficiently fulfils the requirements to be met thereby.
7. An electric circuit board component according to any of the preceding claims, characterized in that the bolt pins (11) projecting beyond the bottom side (6) of housing (1) constitute lugs preferably integrally formed on the lower edge of housing (1) on the outsides of side walls (8, 9) and back wall (10) thereof.
8. An electric circuit board component according to any of the preceding claims, characterized in that the plated inner wall (17) of the bolt holes (12) in the circuit board is of slightly conical design, and that the thus designed bolt holes (12) have their largest inside width on the side of circuit board (7) where the housing-side bolt pins (11) engage in the bolt holes (12).
9. A method of automatically providing circuit boards with electric circuit board components according to claim 1,

characterized in that

360 in a first step, with the aid of a soldering paste,  
all solder connections and all bolt holes (12) on the  
circuit board (11) are provided with a layer of sol-  
dering paste (15),  
365 in a second step, the housing (1) is taken up by an  
automatic pick & place machine and is applied to the  
circuit board (7) exploiting the centering possibili-  
ties established by the bolt pins (11) on the housing  
and the bolt holes (12) in the circuit board, and  
370 in a third step, the circuit board (7) along with the  
housing (1) applied thereto is passed through an SMD  
soldering furnace in which, in one operation, the  
housing-side SMD solder connections of the contacting  
feet (4, 5) are firmly soldered to the solder connec-  
tions assigned thereto on the circuit board on the  
one hand, and the bolt pins (11) on the housing are  
375 firmly soldered to the bolt holes (12) assigned  
thereto on the circuit board on the other hand.

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F04T69 C4T690

**Abstract**

380 Electric Circuit Board Component and Method of Automati-  
cally Providing Circuit Boards with such Components

385 An electric circuit board component, in particular a RF  
coaxial connector, in which the housing (1) of the com-  
ponent is fixed on the circuit board (7) by way of sol-  
der joints between the SMD solder connections provided  
on the bottom side (6) of said housing and solder con-  
nections assigned thereto on the side of the circuit  
board, and in which the housing (1), for additionally  
390 securing the same to the circuit board (7), has on the  
bottom side (6) thereof a plurality of solderable bolt  
pins (11) which engage in continuous plated bolt holes  
(12) assigned thereto on the circuit board (7) and are  
soldered in said bolt holes.

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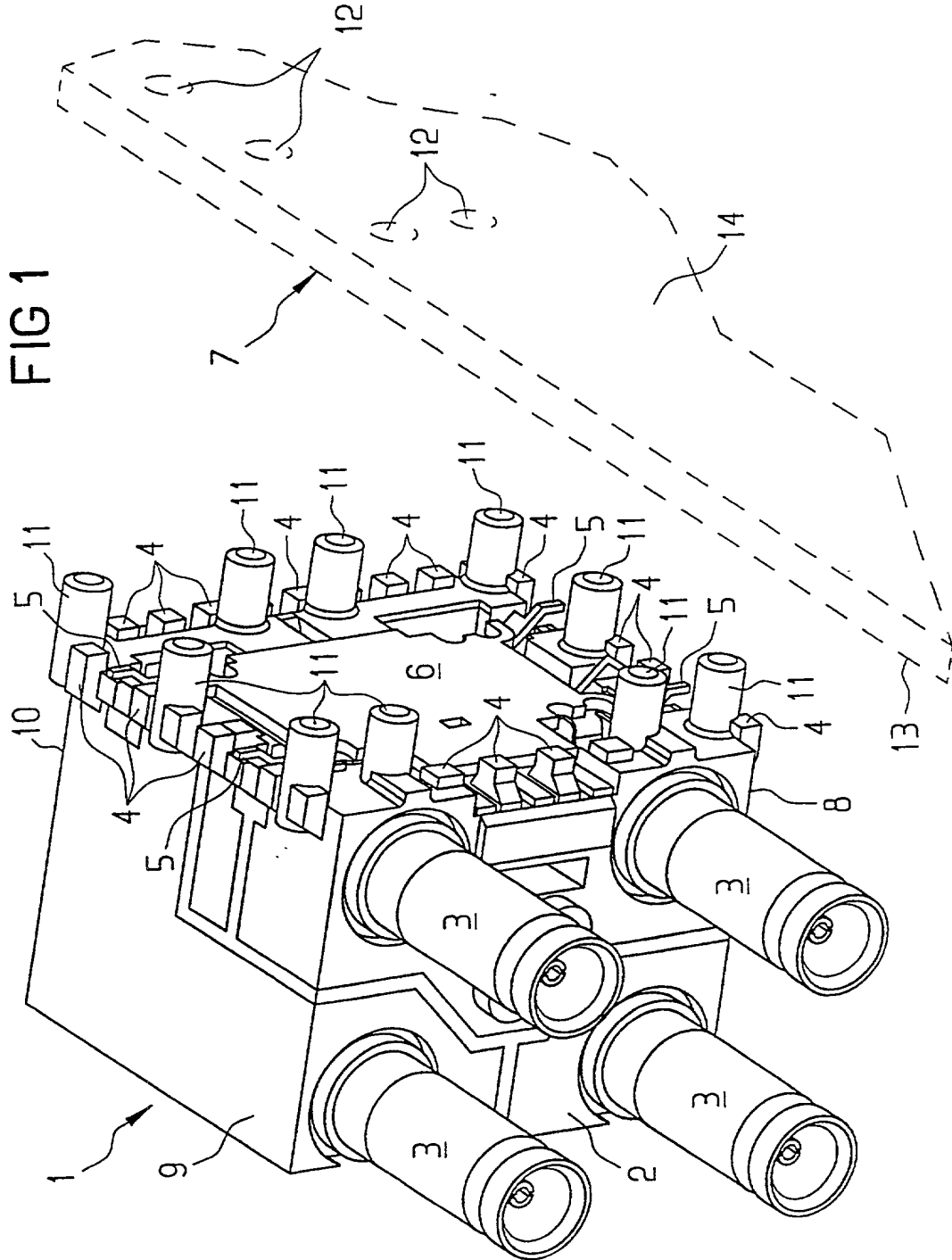


FIG 1

FIG 2

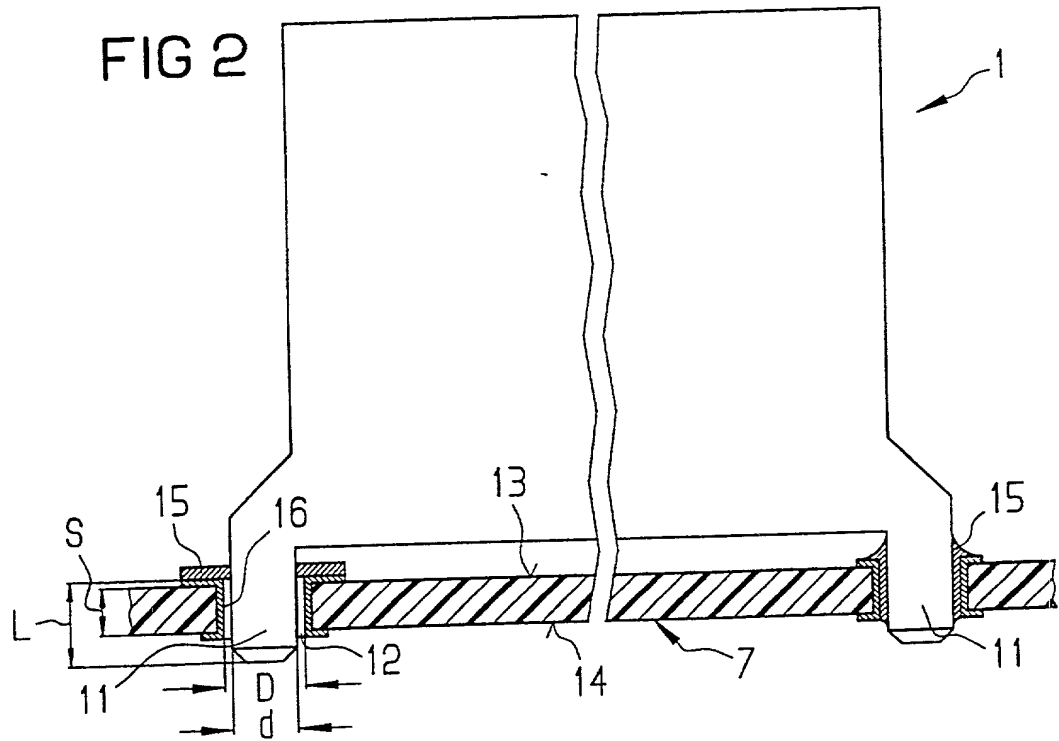
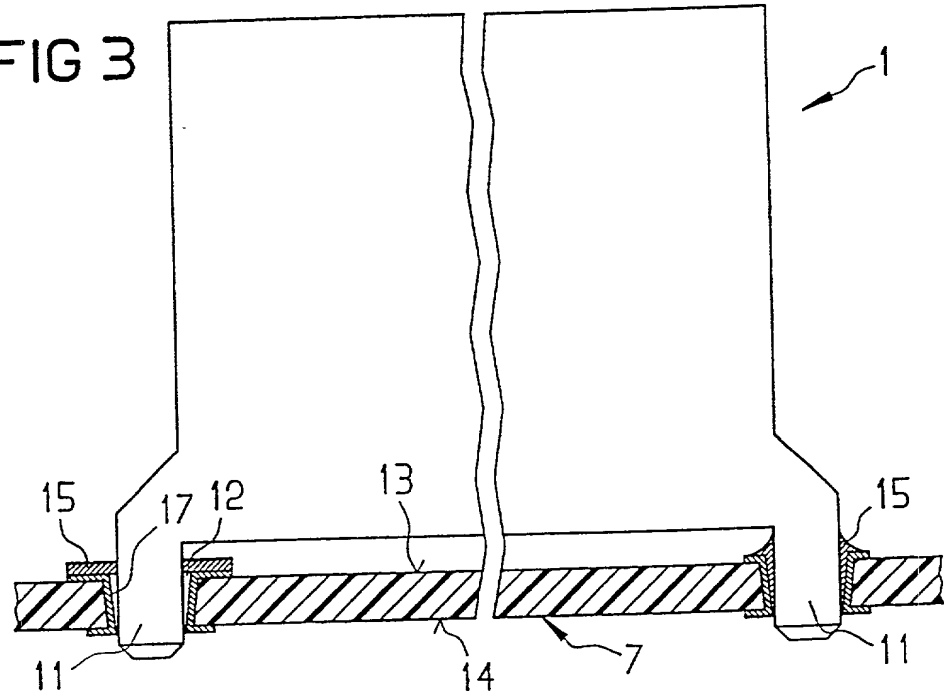


FIG 3



Docket No.  
KSN0013

# Declaration and Power of Attorney For Patent Application

## English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**ELECTRICAL COMPONENTS FOR PRINTED BOARDS AND METHOD FOR AUTOMATICALLY INSERTING SAID COMPONENTS IN PRINTED BOARDS**

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on May 9, 2001 as United States Application No. or PCT International Application Number 09/831,415 and was amended on May 9, 2001 by Preliminary Amendment (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

<u>DE 19851868.4</u>	<u>Germany</u>	<u>10 November 1998</u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u></u>	<u></u>	<u></u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u></u>	<u></u>	<u></u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	

..

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

**PCT/DE99/03493**  
\_\_\_\_\_  
(Application Serial No.)

**2 November 1999**  
\_\_\_\_\_  
(Filing Date)

**Pending**  
\_\_\_\_\_  
(Status)

(patented, pending, abandoned)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

..

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Eric J. Groen, 32,230

Gerard T. Gallagher, 39,679

Daniel Tychonievich, 41,358

Deborah R. Beck, 37,370

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Full name of sole or first inventor

**Reginald Leeman**

Sole or first inventor's signature

Date

8 Aug, 2001

Residence

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BEX

Citizenship

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Full name of second inventor, if any

**Bernard Houteman**

Second inventor's signature

Date

Residence

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Eric J. Groen, 32,230  
 Gerard T. Gallagher, 39,679  
 Daniel Tychonievich, 41,358  
 Deborah R. Beck, 37,370  
 Michael D. Beck, 32,722  
 Kevin R. Erdman, 33,687  
 John F. Hoffman, 26,280  
 Anthony Niewyk, 24,871  
 Nancy G. Tinsley, 37,098  
 Arthur R. Whale, 18,778

Send Correspondence to: Eric J. Groen  
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 (219)234-4149

Full name of sole or first inventor <b>Reginald Leeman</b>	Date
Sole or first inventor's signature	
Residence <b>Marconistraat 4, B-8400 Oostende, Belgium</b>	
Citizenship <b>Belgium</b>	
Post Office Address <b>Marconistraat 4, B-8400 Oostende, Belgium</b>	

2-00

Full name of second inventor, if any <b>Bernard Houteman</b>	<i>Houtteman</i>	Date
Second inventor's signature <i>Bernard Houteman</i>		<b>Aug. 8, 2001</b>
Residence <b>Azaleastraat 10, B-8020 Oostkamp, Belgium</b>	<b>BEX</b>	
Citizenship <b>Belgium</b>		
Post Office Address <b>Azaleastraat 10, B-8020 Oostkamp, Belgium</b>		

3-00  
Full name of third inventor, if any**Georges Embo**

Third inventor's signature

Date

21/08/2001

Residence

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Full name of fourth inventor, if any

**Edgard Acke**

Fourth inventor's signature

Date

Residence

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Citizenship

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Post Office Address

**Splethagestraat 41, B-8020 Oostkamp, Belgium**

Full name of fifth inventor, if any

Fifth inventor's signature

Date

Residence

Citizenship

Post Office Address

Full name of sixth inventor, if any

Sixth inventor's signature

Date

Residence

Citizenship

Post Office Address

Full name of third inventor, if any

**Georges Embo**

Third inventor's signature

Date

Residence

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Full name of fourth inventor, if any

**Edgard Acke**

Fourth inventor's signature

*Acke*

Date

*8.8.01*

Residence

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Citizenship

**Belgium**

Post Office Address

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Full name of fifth inventor, if any

Fifth inventor's signature

Date

Residence

Citizenship

Post Office Address

Full name of sixth inventor, if any

Sixth inventor's signature

Date

Residence

Citizenship

Post Office Address